

-- 32. A method of producing high grade coke from low grade material without causing a pollution problem, comprising the acts of:

introducing a mixture of unwashed non-elutriated low grade non-coking inexpensive coal fines and another type of inexpensive carbonaceous fines comprised of unwashed non-elutriated waste coke fine, as a feedstock influent into a pyrolyzer;

pyrolyzing the mixture in the pyrolyzer;

discharging coke and pyrolytic by-products as effluents from the pyrolyzer. --

-- 33. A method according to Claim 32 further comprising the acts of:

feeding back tar effluent by-product from the pyrolyzer to the feedstock influent mixture;

feeding back combustible off gas effluent by-product from the pyrolyzer to the pyrolyzer and using it as a source of fuel in the pyrolyzer. --

-- 34. A method according to Claim 32 further comprising the act of obtaining a mixture comprising unwashed waste coal fines and unwashed waste coke fines prior to the introducing act. --

-- 35. A method according to Claim 32 further comprising the act of crushing low grade coal and/or the carbonaceous waste coke prior to the introducing act, to obtain the fines. --

-- 36. A method according to Claim 32 further comprising the act of forming the mixture into solid objects prior to the introducing act. --

-- 37. A method according to Claim 35 wherein the discharging act comprises discharging the coke as solid objects. --

-- 38. A method according to Claim 33 wherein the first feeding act comprises combining the feedback tar, a synthetic binder and the mixture of fines prior to the introducing act. - -

-- 39. A method according to Claim 33 wherein the by-product tar is fed back mixed with another binder additive and combined with the mixture of coal fines and waste coke fines prior to the introducing act. - -

-- 40. A method according to Claim 32 wherein the discharging act comprises cooling the by-products and condensing tar to separate the tar from off gas. - -

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-- 41. A method of producing coke from a mixture of non-prime coal fines and waste coke fines comprising the acts of:

introducing a mixture of non-elutriated low grade coal fines and another type of carbonaceous comprising non-elutriated waste coke fines as a feedstock influent into a pyrolyzer;

pyrolyzing the mixture in the pyrolyzer;

discharging segregated coke and pyrolytic by-products as effluents from the pyrolyzer. - -

-- 42. A method according to Claim 41 further comprising the acts of:

separating the pyrolytic by-products into tar and combustible off gas;

combining the separated tar as a binder with the mixture of coal and coke fines in the mixture;

returning the combustible off gas to the pyrolyzer as a source of fuel. - -

-- 43. A method according to Claim 41 wherein the introducing act comprises obtaining a mixture comprising non-elutriated waste coke fines and non-elutriated waste coal fines. - -

-- 44. A method according to Claim 41 further comprising the act of crushing at least some of the coke and/or the coal, prior to the introducing act. - -

-- 45. A method according to Claim 41 further comprising the act of forming the mixture into solid objects prior to the introducing act. - -

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-- 46. A method according to Claim 45 wherein the discharging act comprises discharging the coke from the pyrolyzer as solid objects. - -

-- 47. A method according to Claim 42 wherein the combining act comprises combining the separated tar, a synthetic binder and the mixture of coal and coke fines prior to the introducing act. - -

-- 48. A method according to Claim 42 wherein the separated tar is fed back to the coal and coke mixture prior to the introducing act. - -

-- 49. A method according to Claim 42 wherein the separating act comprises cooling the by-products to condense tar to separate the tar from off gas. - -

-- 50. A method of producing coke from low grade coal and coke fines, comprising the acts of:

obtaining and mixing unwashed low grade coal fines and unwashed coke fines;  
introducing the unwashed mixture of lower grade coal fines and waste coke fines as an influent into a pyrolyzer;  
pyrolyzing the unwashed mixture in the pyrolyzer;  
discharging segregated coke, on the one hand, and pyrolytic by-products comprising combustible off gas and tar on the other hand, as effluents from the pyrolyzer;  
separating the pyrolytic by-products into segregated tar and combustible off-gas;  
adding the segregated tar as a binder to the coal and coke fines mixture;  
returning the segregated combustible off gas to the pyrolyzer as a source of fuel. - -

-- 51. A method according to Claim 50 further comprising the act of crushing oversized unwashed waste coke and/or unwashed oversized low grade coal, to correctly size the fines. - -

-- 52. A method according to Claim 50 further comprising the act of forming the mixture into solid objects to the introducing act. - -

-- 53. A method according to Claim 52 wherein the discharging act comprises discharging the coke from the pyrolyzer as solid objects. - -

-- 54. A method according to Claim 50 wherein the adding act comprises combining the separated tar, a synthetic binder and the mixture of coal and coke fines prior to the introducing act. - -

-- 55. A method according to Claim 50 wherein the separated tar is fed back to the mixture of coal and coke fines. - -

-- 56. A method according to Claim 50 wherein low grade coal comprises 20-40% by weight of the coal and coke mixture. - -

-- 57. A method according to Claim 50 wherein the coke fines comprise petroleum coke fines which comprise 40-70% by weight of the coal and coke mixture. - -

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-- 58. A method according to Claim 50 wherein the coke fines comprise coke breeze fines which comprise 5-10% by weight of the coal and coke mixture.

-- 59. A method according to Claim 50 wherein the pyrolyzing act comprises heating the introduced mixture to a temperature within the range of 800-1100°C at a rate within the range of 1500-2000°C/hour to lower coke volatility below 2%. - -

-- 60. A method according to Claim 50 wherein the separating act comprises cooling the by-products to about 300°C and condensing the tar to separate the tar from the off gas. - -

-- 61. A method of producing high quality coke from a mixture of low grade and/or waste carbonaceous materials at a much lower cost comprising the acts of:

absent elutriation, introducing a mixture of low grade coal fines and waste coke fines as an influent into a pyrolyzer;

pyrolyzing the mixture of fines in the pyrolyzer;

discharging the coke, and pyrolytic by-products from the pyrolyzer. - -

-- 62. A method according to Claim 61 wherein the by-products comprise tar and combustible gas and further comprising the acts of:

condensing the tar;

using the tar as a binder for the mixture of coal and coke;

using the combustible off-gas as a source of fuel in the pyrolyzer. - -

-- 63. A method of producing coke from non-traditional carbonaceous materials comprising the acts of:

introducing a mixture of unwashed waste coke fines and unwashed non-coking grade coal fines as an influent into a pyrolyzer;

pyrolyzing the mixture in the pyrolyzer;

discharging the coke, and pyrolytic by-products comprising combustible off-gas and tar as effluents from the pyrolyzer. - -

- - 64. A method according to Claim 63 comprising the further acts of:

condensing the tar to separate the tar and off-gas;

using the tar as a binder for the mixture fines prior to the mixing act;

using the combustible off-gas as a source of fuel in the pyrolyzer. - -

- - 65. A method according to Claim 64 wherein all condensed tar is utilized as binder and all combustible off-gas is used to fuel the pyrolyzer. - -

- - 66. A method according to Claim 64 wherein the condensed tar is the sole binder source and the combustible off-gas is the sole source of fuel for the pyrolyzer. - -

- - 67. A method of cost effectively producing high quality coke from a mixture of non-traditional carbonaceous materials comprising the acts of:

without washing or elutriation, introducing into a pyrolyzer a mixture comprising low grade coal fines and coke fines as salvage from prior production of coke;

pyrolyzing the mixture and obtaining segregated coke and by-products. - -

- - 68. A method of producing coke, comprising the acts of:

mixing a binder, low grade non-prime unwashed coal fines selected from the group consisting of unwashed waste non-coking coal fines and unwashed non-coking coal fines and unwashed salvage coke fines selected from the group consisting of unwashed waste petroleum fines, unwashed waste char fines and unwashed waste coke breeze, without regard to a free swelling index value;

introducing the mixture into a pyrolyzer;

pyrolyzing the mixture to derive coke, tar and combustible off-gas. - -

-- 69. A method according to Claim 68 wherein the method is performed in a closed system and further comprising the acts of:

causing all of the tar to comprise the binder;

fueling the pyrolyzer with the combustible off-gas. - -

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